

5.5.14

M. E (EE) 2nd SEMESTER EXAMINATION 2014

POWER SYSTEM PROTECTION

(EE-1015)

Time: 3 Hours

Full Marks: 70

Two marks are reserved for neatness in each group**GROUP-A**(Answer Q.No. 1 and any three from this group)

- 1 What happens when (any four) [11]
- Generator Lock Out relay operates
 - Low Forward Power relay operates.
 - Turbine Lock Out relay operates.
 - Both I.D fan trip.
 - Generator Field Breaker trips.
 - Abnormally low furnace draft.
- Annunciation appears in the annunciation panel. Justify your answer with the help of Logic diagram and state the status of GLR, TLR and MFR in each case.
- 2 a) Obtain the inputs to the Mho relay. How it behaves for close-up fault?
Why is a Mho relay Polarised? Derive the expression for polarizing voltage for Phase fault relay element. [(2+2+2) +5]
- 3 a) Obtain the straight line characteristic from the generalized theory of asymmetric Phase comparator.
b) Establish the theory of Duality between phase and amplitude comparator. [5+6]
- 4.a) Explain theory of operation of Block Instantaneous type phase comparator. State its disadvantages.
b) Explain principle of operation of Block Average type phase comparator? State its advantages. [5+6]
- 5) a) Derive the input quantities necessary to develop i) directional relay, ii) MHO relay characteristic by using asymmetric phase comparator.
b) Obtain i) Restricted directional and ii) Restricted reactance relay characteristics by using 90° phase comparator. [(2+3) + (3+3)]
- 6 a) Explain the theory of multi-input co-incidence comparator. Name different types of co-incidence type phase comparator. [3+2]
b) Obtain the quadrilateral characteristics using 4-input co-incidence comparator. [6]

Group-B(Answer any two from this group)

1. a) What do you mean by adaptive relaying? Enumerate this type of relaying with its applications in i) transformer ii) line protection
b) What is WAMS? Explain its significance in power system relaying. [7+4]
- 2 a) Why is "isolation and scaling" unit necessary as a functional block of a numerical relay?
b) What is the role of Nyquist Sampling Criterion in designing a numerical relaying scheme for overcurrent protection in transformers?
c) What are orthogonal functions? Explain their significance in computer-aided relaying. [3+4+4]
- 3a) Design the building blocks of an impedance relay using the 8086 microprocessor. State its area of implementation. Enumerate the schematic layout, the functional blocks and their purpose and also frame the flowchart of the numerical impedance relay?

[11]